AMENDMENTS TO THE CLAIMS

Please amend the Claims as follows:

1. **(Currently Amended)** A quadrature modulator comprising:

a local oscillator for oscillating at an oscillation frequency;

a frequency conversion block for converting said oscillation frequency to output a converted oscillation frequency; and

a quadrature modulation block comprising a frequency divider, a first and second multiplier, and an adder, said frequency divider ~~for~~ receiving ~~a baseband signal and~~ said converted oscillation frequency~~, said quadrature modulation block including a first frequency divider for~~ and dividing said converted oscillation frequency by a factor of two to output a pair of orthogonal signals having therebetween a phase difference of 90 degrees, said first and second multipliers ~~for~~ modulating said pair of orthogonal signals with said baseband signal to output a pair of modulated signals, and ~~an~~ said adder ~~for~~ adding said modulated signals together to output a carrier signal,

wherein said carrier signal has a frequency different from said converted oscillation frequency and any signal frequency generated within said frequency conversion block.

2. **(Previously Presented)** The quadrature modulator as defined in claim 1, wherein:

the oscillation frequency is equal to 4/(2N+1) times the carrier frequency where N is a natural number,

the frequency conversion block is adapted to multiply said oscillation frequency by a factor of (2N+1)/2,

the first frequency divider divides an output from said frequency conversion block by a factor of two to output a pair of carrier waves having therebetween a phase difference of 90 degrees,

the first and second multipliers modulate said carrier waves with a digital baseband signal to output a pair of modulated signals, and

the adder adds said modulated signals together to output a digital carrier signal having said carrier frequency,

said N is equal to "1", and

said frequency conversion block includes a second frequency divider for dividing said oscillation frequency by a factor of two to generate a divided frequency, and a frequency mixer for mixing outputs from said local oscillator and said frequency divider to generate a first signal having a frequency equal to a sum of said oscillation frequency and said divided frequency.

3. **(Original)** The quadrature modulator as defined in claim 2, wherein said frequency conversion block further includes a band-pass-filter (BPF) for removing an image signal from said first signal.

4. **(Original)** The quadrature modulator as defined in claim 2, wherein said frequency mixer is a double-balanced mixer.

5. **(Previously Presented)** A quadrature modulator comprising a local oscillator for oscillating at an oscillation frequency equal to 4/(2N+1) times a carrier frequency where N is a natural number, a frequency conversion block for multiplying said oscillation frequency by a factor of (2N+1)/2, a first frequency divider to divide an output from said frequency conversion block by a

factor of two to output a pair of carrier waves having therebetween a phase difference of 90 degrees, first and second multipliers for modulating said carrier waves with a digital baseband signal to output a pair of modulated signals, and an adder for adding said modulated signals together to output a digital carrier signal having said carrier frequency, wherein said N is equal to or more than "2", and said frequency conversion block includes a second frequency divider for dividing said oscillation frequency by a factor of two to output a divided frequency, one of N frequency mixers cascaded from one another, which is connected to said second divider, outputs a signal having a frequency equal to a sum of said oscillation frequency and said divided frequency from said second divider, and each of the remaining (N-1) frequency mixers of said N frequency mixers outputs a sum of said oscillation frequency and an output frequency from a preceding frequency mixer of said N cascaded frequency mixers.

6. **(Original)** The quadrature modulator as defined in claim 5, wherein said frequency conversion block further includes a BPF cascaded from an N-th one of said frequency mixers to remove an image signal from said first signal from said N-th one of said frequency mixers.

7. **(Original)** The quadrature modulator as defined in claim 5, wherein each of said frequency mixers is a double-balanced mixer.

8. **(Cancelled)**

9. **(Previously Presented)** A quadrature modulator comprising:

a digital signal generator for generating a digital baseband signal;

a local oscillator for oscillating at an oscillation frequency equal to 4/(2N+1) times a carrier frequency where N is a natural number;

a frequency conversion block for multiplying said oscillation frequency by a factor of (2N+1)/2; and

a quadrature modulation block including:

a first frequency divider to divide an output from said frequency conversion block by a factor of two to output a pair of carrier waves having therebetween a phase difference of 90 degrees;

first and second multipliers for modulating said carrier waves with said digital baseband signal to output a pair of modulated signals; and

an adder for adding said modulated signals together to output a digital carrier signal having said carrier frequency,

wherein said frequency conversion block includes a band-pass-filter (BPF) for removing an image signal from said first signal, and

wherein an output signal from said band-pass-filter (BPF) of said frequency conversion block is supplied directly as an input signal to said first frequency divider of said quadrature modulation block,

said quadrature modulator not including a frequency multiplier.

10. (Previously Presented) The quadrature modulator as defined in claim 1, wherein said frequency conversion block includes a frequency divider for dividing said oscillation frequency by a factor of two, a frequency mixer for generating a mixed frequency signal having a frequency equal to a sum of said oscillation frequency and said converted oscillation frequency, and a band-pass filter for removing an image signal component from said mixed frequency signal.

11. (Previously Presented) A quadrature modulator comprising:

a local oscillator for oscillating at an oscillation frequency;

a frequency conversion block for converting said oscillation frequency to output a converted oscillation frequency: and

a quadrature modulation block for receiving a baseband signal and said converted oscillation frequency, said quadrature modulation block including a first frequency divider for dividing said converted oscillation frequency by a factor of two to output a pair of orthogonal signals having therebetween a phase difference of 90 degrees, first and second multipliers for modulating said pair of orthogonal signals with said baseband signal to output a pair of modulated signals, and an adder for adding said modulated signals together to output a carrier signal.

wherein said carrier signal has a frequency different from said converted oscillation frequency; and

wherein said frequency conversion block includes a frequency divider for dividing said oscillation frequency by a factor of two, a first frequency mixer for generating a first mixed frequency signal having a frequency equal to a sum of said oscillation frequency and said converted oscillation frequency, a second frequency mixer for generating a second mixed frequency signal having a frequency equal to a sum of said oscillation frequency and said first mixed frequency signal to output a second mixed frequency signal, and a band-pass-filter for removing an image signal component from said second mixed frequency signal.

12. (Previously Presented) A quadrature modulator comprising:

a local oscillator for oscillating at an oscillation frequency;

a frequency conversion block for converting said oscillation frequency to output a converted oscillation frequency: and

a quadrature modulation block for receiving a baseband signal and said converted oscillation frequency, said quadrature modulation block including a first frequency divider for dividing said converted oscillation frequency by a factor of two to output a pair of orthogonal signals having therebetween a phase difference of 90 degrees, first and second multipliers for modulating said pair of orthogonal signals with said baseband signal to output a pair of modulated signals, and an adder for adding said modulated signals together to output a carrier signal,

wherein:

said carrier signal has a frequency different from said converted oscillation frequency,

the oscillation frequency is equal to 4/(2N+1) times a carrier frequency where N is a natural number,

the frequency conversion block multiples said oscillation frequency by a factor of (2N+1)/2,

the first frequency divides an output from said frequency conversion block by a factor of two to output a pair of carrier waves having therebetween a phase difference of 90 degrees,

the first and second multipliers are adapted to modulate said carrier waves with a digital baseband signal,

the adder is adapted to add said modulated signals together to output a digital carrier signal having said carrier frequency, and

said frequency conversion block includes only one frequency divider for dividing said oscillation frequency by a factor of two to generate a divided frequency.

13. (Currently Amended) A method comprising the steps of:

generating an oscillation frequency;

converting said oscillation frequency to output a converted oscillation frequency;

dividing said converted oscillation frequency by a factor of two to output a pair of orthogonal signals having therebetween a phase difference of 90 degrees;

modulating said pair of orthogonal signals with a baseband signal to output a pair of modulated signals; and

adding said modulated signals together to output a carrier signal,

wherein said carrier signal has a frequency different from said converted oscillation frequency <u>and any signal frequency generated within said frequency conversion block</u>.

14. (Previously Presented) The method as defined in claim 13, wherein said converting operation further includes removing an image signal from said first signal using a band-pass-filter (BPF).

15. (Previously Presented) The quadrature modulator as defined in claim 1, wherein said carrier signal has a frequency different from said oscillation frequency.

16. (Previously Presented) The method as defined in claim 13, wherein said carrier signal has a frequency different from said oscillation frequency.

17. (New) The quadrature modulator as defined in claim 1, wherein the frequency divider of the quadrature modulation block receives the converted oscillation frequency.